Maplewood Elementary School

STORMWATER CALCULATIONS

BY

LARSON ENGINEERING

April 13, 2020

CONTENTS:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Greg A. Buchal, P.E.	April 13, 2020	23793
	Date	Registration No.

Maplewood Elementary School

SUMMARY OF STORMWATER RUNOFF

Introduction
This project consists of demolition of the existing school building, roadway, and parking lot and construction of a new school building, parking lot, sidewalk, two surface filtration basins, and all associated utility work and erosion control measures. Existing rain gardens at the site will remain. Construction of the project will be phased such that the existing school building will be demolished after the construction of the new school building is completed. There are no wetland impacts associated with the project.

Existing Conditions:
The existing site consist of a middle school, tennis courts, an existing roadway, a parking lot, and a two rain garden stormwater features.

Soil borings indicated that the predominate soils in the proposed basin areas consist of lean clay and sandy lean clay. Grassed areas were modeled as >75% Grass Cover, Type D Soils, with a Curve Number of 80. The impervious surfaces were modeled with a Curve Number of 98.

Proposed Conditions:
The majority of runoff from the new proposed conditions will be routed to filtration basins on the Southeast side of the property. The runoff will discharge into sumps prior to entering the filtration basin for pre-treatment.

The filtration basin will consist of plantings, 12" of a soil mixture (80% clean free draining sand and 20% organic matter) with 4" perforated draintile below the sand section. The filtration basin was modeled with an infiltration rate of 0.8 in/hr.

The proposed conditions were modeled as >75% Grass Cover, Type D soils, with a Curve Number of 80. The impervious surfaces were modeled with a Curve Number of 98.

Note: Runoff water from the new site will be directed toward existing rain gardens. Overflow runoff from the Eastern raingarden will directed toward Filtration Basin #1 for treatment.

Analysis:

The project area was analyzed using HydroCAD Version 10.0 Stormwater modeling software. SCS TR-20 modeling method, along with the MSE 24-hour storm event, were utilized in the modeling of the existing and proposed runoff conditions. The 2-year, 10-year, and 100-year storm events were used to model runoff conditions. Output from NOAA Atlas 14 precipitation frequency data server was used for storm event depths.

Runoff Rate
Per Ramsey-Washington Metro Watershed District Runoff Control Requirements, proposed runoff rates shall not exceed existing runoff rates for the 2, 10, and 100-yr critical storm events using Atlas 14 precipitation depths and storm distributions.

Existing peak runoff rates (in cubic feet per second):

Area	2-year	10-year	100-year
Off site to the West	3.60	6.53	13.67
Off site to the Southeast	14.54	26.54	55.76
Total	**18.14**	**33.07**	**69.43**

Proposed peak runoff rates (in cubic feet per second):

Area	2-year	10-year	100-year
Off site to the West	3.87	7.60	16.90
Off site to the Southeast	3.21	8.84	29.06
Total	**7.08**	**16.44**	**45.96**

Water Quality Volume:
Per Ramsey-Washington Metro Watershed District requirements, the water quality volume shall be retained on site. Infiltration on site has been deemed infeasible due to the existing clay soils, see attached geotechnical report. Therefore, a filtration basin was implemented as the BMP. The water quality treatment volume requirement is 1.1" of rainfall over all new/reconstructed impervious surfaces multiplied by the filtration credit which is 1.82.

Stormwater entering the filtration basin will be first pretreated by sumps in storm structures prior to entering the filtration basins.

Filtration Basin #1 Design:

New/Reconstructed Impervious	=	165,580 SF
Basin #1 Minimum Required WQV	=	165,580 SF x1.1"x1.82 = 27,624 CF
Basin #1 Credit Cap	=	165,580 SF x2.5" = 34,496 CF
Basin #1 WQV Elevation/Outlet	=	1017.90
Basin #1 WQV at Outlet	=	32,533 CF
Basin #1 Allowable Drawdown	=	0.8 in/hr x 48 hrs = 3.2'
Basin #1 Bottom	=	1015.00'
Basin #1 Outlet	=	1017.90'

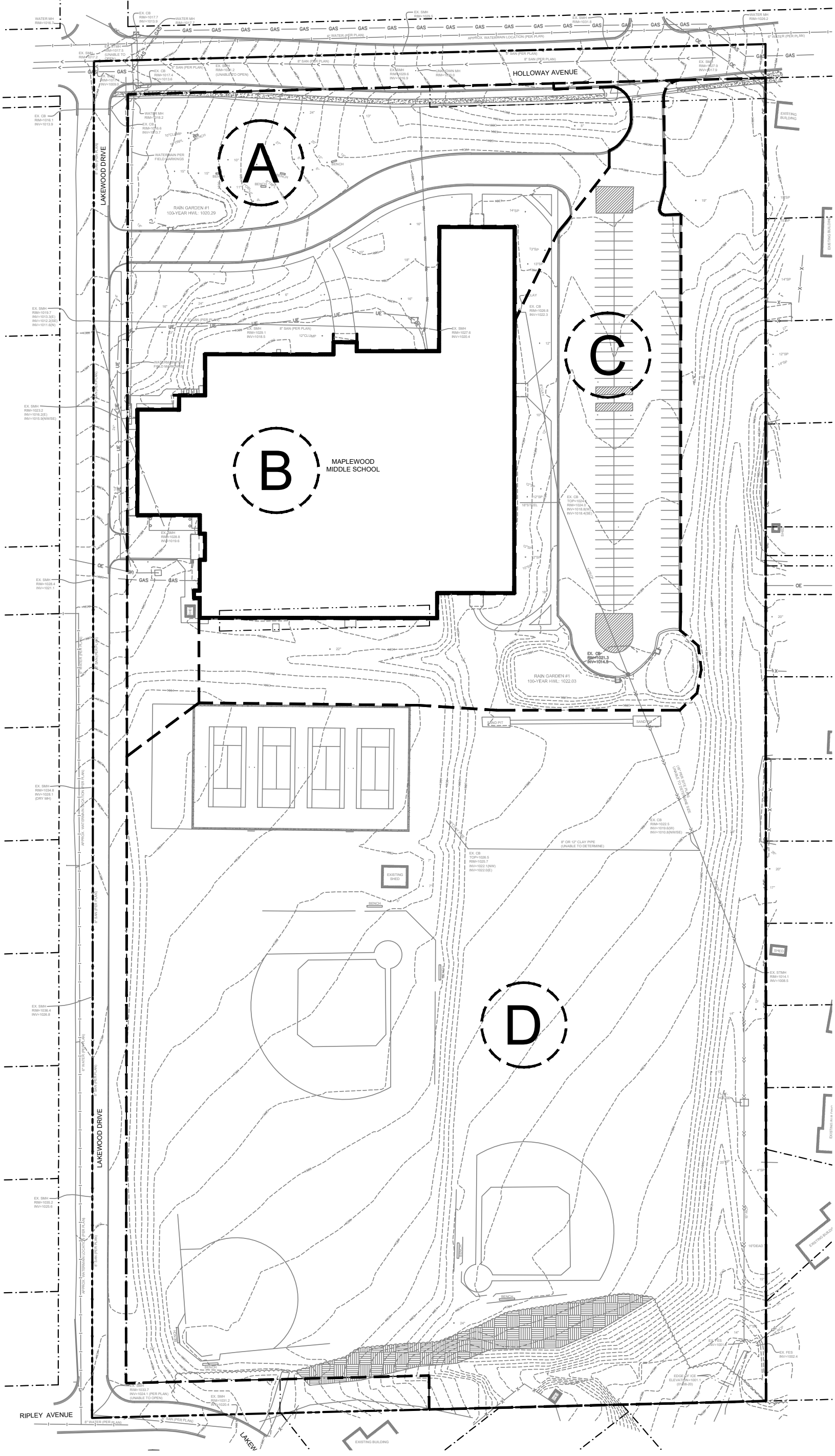
Filtration Basin #2 Design:

New/Reconstructed Impervious	=	53,735 SF
Basin #1 Minimum Required WQV	=	53,735 SF x1.1"x1.82 = 8,965 CF
Basin #1 Credit Cap	=	165,580 SF x2.5" = 11,195 CF
Basin #2 WQV Elevation/Outlet	=	1023.20'
Basin #2 WQV at Outlet	=	20,240 CF
Basin #2 Allowable Drawdown	=	0.8 in/hr x 48 hrs = 3.2'
Basin #2 Bottom	=	1020.00'
Basin #2 Outlet	=	1023.20'

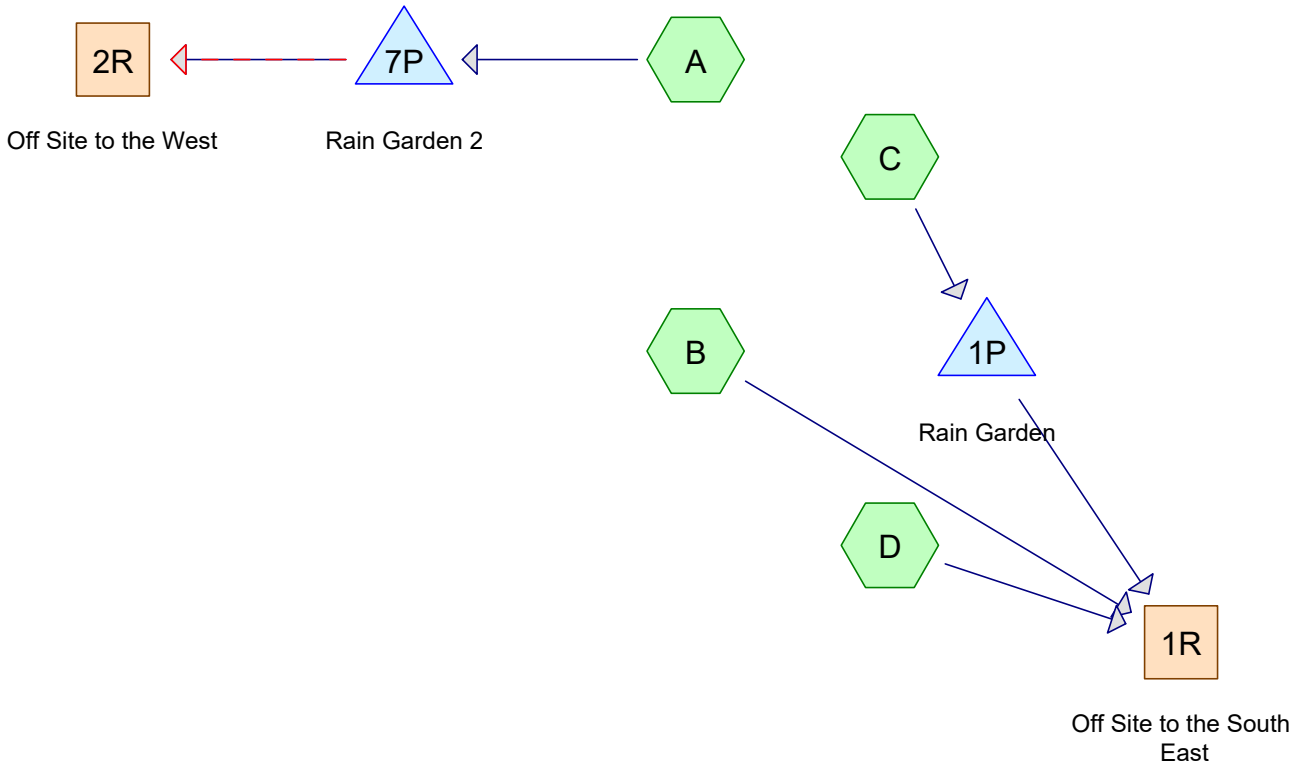
Required Water Quality Volume:

New/Reconstructed Impervious	=	219,315 SF
Required WQV	=	219,315 SF x 1.1" x 1.82 = 36,589 CF
Provided WQV	=	32,533 CF + 11,195 CF = 43,728 CF

EXISTING HYDROCAD AREAS



Maplewood Elementary
Existing Drainage



Subcat Reach Pond Link

Routing Diagram for Existing Conditions
Prepared by Larson Engineering, Printed 4/13/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
541,840	80	>75% Grass cover, Good, HSG D (A, C, D)
249,475	98	Impervious (A, B, C, D)
791,315	**86**	**TOTAL AREA**

Summary for Subcatchment A:

Runoff = 3.66 cfs @ 12.40 hrs, Volume= 14,968 cf, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	31,084	98	Impervious
	89,646	80	>75% Grass cover, Good, HSG D
	120,730	85	Weighted Average
	89,646		74.25% Pervious Area
	31,084		25.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	300	0.0416	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment B:

Runoff = 9.28 cfs @ 12.12 hrs, Volume= 20,165 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	93,825	98	Impervious
	93,825		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment C:

Runoff = 4.08 cfs @ 12.43 hrs, Volume= 17,996 cf, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	63,102	98	Impervious
	47,958	80	>75% Grass cover, Good, HSG D
	111,060	90	Weighted Average
	47,958		43.18% Pervious Area
	63,102		56.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.5	292	0.0308	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment D:

Runoff = 9.87 cfs @ 12.59 hrs, Volume= 50,581 cf, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	61,464	98	Impervious
	404,236	80	>75% Grass cover, Good, HSG D
	465,700	82	Weighted Average
	404,236		86.80% Pervious Area
	61,464		13.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.2	300	0.0185	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.1	130	0.0180	2.01		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	23	0.2500	7.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.7	225	0.0220	2.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.4	122	0.1311	5.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
41.5	800	Total			

Summary for Reach 1R: Off Site to the South East

Inflow Area = 670,585 sf, 32.57% Impervious, Inflow Depth = 1.59" for 2-Year event
Inflow = 14.54 cfs @ 12.54 hrs, Volume= 88,743 cf
Outflow = 14.54 cfs @ 12.54 hrs, Volume= 88,743 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Off Site to the West

Inflow Area = 120,730 sf, 25.75% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 3.60 cfs @ 12.44 hrs, Volume= 14,969 cf
Outflow = 3.60 cfs @ 12.44 hrs, Volume= 14,969 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Rain Garden

Inflow Area = 111,060 sf, 56.82% Impervious, Inflow Depth = 1.94" for 2-Year event
Inflow = 4.08 cfs @ 12.43 hrs, Volume= 17,996 cf
Outflow = 3.75 cfs @ 12.53 hrs, Volume= 17,997 cf, Atten= 8%, Lag= 5.6 min
Primary = 3.75 cfs @ 12.53 hrs, Volume= 17,997 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
Peak Elev= 1,021.73' @ 12.53 hrs Surf.Area= 6,863 sf Storage= 4,052 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 114.0 min (906.9 - 792.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,021.00'	17,908 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,021.00	4,217	0	0
1,022.00	7,835	6,026	6,026
1,023.00	15,928	11,882	17,908

Device	Routing	Invert	Outlet Devices
#1	Primary	1,014.50'	**18.0" Round Culvert** L= 185.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,014.50' / 1,010.80' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	1,018.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,021.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Device 1	1,021.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=3.75 cfs @ 12.53 hrs HW=1,021.73' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.75 cfs of 21.66 cfs potential flow)
  - **2=Orifice/Grate** (Passes 0.13 cfs of 0.79 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.13 cfs)
  - **4=Sharp-Crested Rectangular Weir** (Weir Controls 3.62 cfs @ 1.57 fps)

Summary for Pond 7P: Rain Garden 2

Inflow Area = 120,730 sf, 25.75% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 3.66 cfs @ 12.40 hrs, Volume= 14,968 cf
Outflow = 3.60 cfs @ 12.44 hrs, Volume= 14,969 cf, Atten= 2%, Lag= 2.2 min
Primary = 0.09 cfs @ 12.44 hrs, Volume= 5,535 cf
Secondary = 3.50 cfs @ 12.44 hrs, Volume= 9,434 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
Peak Elev= 1,020.12' @ 12.44 hrs Surf.Area= 5,056 sf Storage= 2,904 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 179.4 min (989.7 - 810.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,019.00'	13,917 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	1,833	0	0
1,020.00	3,000	2,417	2,417
1,021.00	20,000	11,500	13,917

Device	Routing	Invert	Outlet Devices
#1	Primary	1,013.67'	**15.0" Round Culvert** L= 34.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,013.67' / 1,013.60' S= 0.0020 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,017.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,019.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,020.00'	**35.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.09 cfs @ 12.44 hrs HW=1,020.12' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.09 cfs of 14.26 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.09 cfs of 0.66 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=3.50 cfs @ 12.44 hrs HW=1,020.12' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 3.50 cfs @ 0.83 fps)

Summary for Subcatchment A:

Runoff = 6.61 cfs @ 12.40 hrs, Volume= 26,677 cf, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	31,084	98	Impervious
	89,646	80	>75% Grass cover, Good, HSG D
	120,730	85	Weighted Average
	89,646		74.25% Pervious Area
	31,084		25.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	300	0.0416	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment B:

Runoff = 13.95 cfs @ 12.12 hrs, Volume= 30,921 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	93,825	98	Impervious
	93,825		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment C:

Runoff = 6.71 cfs @ 12.43 hrs, Volume= 29,587 cf, Depth= 3.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	63,102	98	Impervious
	47,958	80	>75% Grass cover, Good, HSG D
	111,060	90	Weighted Average
	47,958		43.18% Pervious Area
	63,102		56.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.5	292	0.0308	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment D:

Runoff = 18.79 cfs @ 12.59 hrs, Volume= 94,355 cf, Depth= 2.43"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	61,464	98	Impervious
	404,236	80	>75% Grass cover, Good, HSG D
	465,700	82	Weighted Average
	404,236		86.80% Pervious Area
	61,464		13.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.2	300	0.0185	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.1	130	0.0180	2.01		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	23	0.2500	7.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.7	225	0.0220	2.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.4	122	0.1311	5.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
41.5	800	Total			

Summary for Reach 1R: Off Site to the South East

Inflow Area = 670,585 sf, 32.57% Impervious, Inflow Depth = 2.77" for 10-Year event
Inflow = 26.54 cfs @ 12.54 hrs, Volume= 154,863 cf
Outflow = 26.54 cfs @ 12.54 hrs, Volume= 154,863 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Off Site to the West

Inflow Area = 120,730 sf, 25.75% Impervious, Inflow Depth = 2.65" for 10-Year event
Inflow = 6.53 cfs @ 12.42 hrs, Volume= 26,677 cf
Outflow = 6.53 cfs @ 12.42 hrs, Volume= 26,677 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Rain Garden

Inflow Area = 111,060 sf, 56.82% Impervious, Inflow Depth = 3.20" for 10-Year event
Inflow = 6.71 cfs @ 12.43 hrs, Volume= 29,587 cf
Outflow = 6.39 cfs @ 12.50 hrs, Volume= 29,587 cf, Atten= 5%, Lag= 4.0 min
Primary = 6.39 cfs @ 12.50 hrs, Volume= 29,587 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
Peak Elev= 1,021.83' @ 12.50 hrs Surf.Area= 7,233 sf Storage= 4,773 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 84.9 min (872.3 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,021.00'	17,908 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,021.00	4,217	0	0
1,022.00	7,835	6,026	6,026
1,023.00	15,928	11,882	17,908

Device	Routing	Invert	Outlet Devices
#1	Primary	1,014.50'	**18.0" Round Culvert** L= 185.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,014.50' / 1,010.80' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	1,018.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,021.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Device 1	1,021.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=6.39 cfs @ 12.50 hrs HW=1,021.83' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 6.39 cfs of 21.83 cfs potential flow)
  - **2=Orifice/Grate** (Passes 0.13 cfs of 0.80 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.13 cfs)
  - **4=Sharp-Crested Rectangular Weir** (Weir Controls 6.26 cfs @ 1.89 fps)

Summary for Pond 7P: Rain Garden 2

Inflow Area = 120,730 sf, 25.75% Impervious, Inflow Depth = 2.65" for 10-Year event
Inflow = 6.61 cfs @ 12.40 hrs, Volume= 26,677 cf
Outflow = 6.53 cfs @ 12.42 hrs, Volume= 26,677 cf, Atten= 1%, Lag= 1.5 min
Primary = 0.11 cfs @ 12.42 hrs, Volume= 6,090 cf
Secondary = 6.42 cfs @ 12.42 hrs, Volume= 20,586 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
Peak Elev= 1,020.18' @ 12.42 hrs Surf.Area= 6,078 sf Storage= 3,238 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 109.3 min (912.4 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,019.00'	13,917 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	1,833	0	0
1,020.00	3,000	2,417	2,417
1,021.00	20,000	11,500	13,917

Device	Routing	Invert	Outlet Devices
#1	Primary	1,013.67'	**15.0" Round Culvert** L= 34.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,013.67' / 1,013.60' S= 0.0020 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,017.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,019.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,020.00'	**35.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.11 cfs @ 12.42 hrs HW=1,020.18' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.11 cfs of 14.34 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.11 cfs of 0.67 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.11 cfs)

Secondary OutFlow Max=6.42 cfs @ 12.42 hrs HW=1,020.18' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 6.42 cfs @ 1.01 fps)

Summary for Subcatchment A:

Runoff = 13.81 cfs @ 12.40 hrs, Volume= 56,005 cf, Depth= 5.57"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	31,084	98	Impervious
	89,646	80	>75% Grass cover, Good, HSG D
	120,730	85	Weighted Average
	89,646		74.25% Pervious Area
	31,084		25.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	300	0.0416	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment B:

Runoff = 24.62 cfs @ 12.12 hrs, Volume= 55,674 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	93,825	98	Impervious
	93,825		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment C:

Runoff = 12.93 cfs @ 12.43 hrs, Volume= 57,537 cf, Depth= 6.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	63,102	98	Impervious
	47,958	80	>75% Grass cover, Good, HSG D
	111,060	90	Weighted Average
	47,958		43.18% Pervious Area
	63,102		56.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.5	292	0.0308	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment D:

Runoff = 40.82 cfs @ 12.58 hrs, Volume= 205,838 cf, Depth= 5.30"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	61,464	98	Impervious
	404,236	80	>75% Grass cover, Good, HSG D
	465,700	82	Weighted Average
	404,236		86.80% Pervious Area
	61,464		13.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.2	300	0.0185	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.1	130	0.0180	2.01		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.1	23	0.2500	7.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.7	225	0.0220	2.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
0.4	122	0.1311	5.43		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
41.5	800	Total			

Summary for Reach 1R: Off Site to the South East

Inflow Area = 670,585 sf, 32.57% Impervious, Inflow Depth = 5.71" for 100-Year event
Inflow = 55.76 cfs @ 12.53 hrs, Volume= 319,050 cf
Outflow = 55.76 cfs @ 12.53 hrs, Volume= 319,050 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs

Summary for Reach 2R: Off Site to the West

Inflow Area = 120,730 sf, 25.75% Impervious, Inflow Depth = 5.57" for 100-Year event
Inflow = 13.67 cfs @ 12.42 hrs, Volume= 56,005 cf
Outflow = 13.67 cfs @ 12.42 hrs, Volume= 56,005 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Rain Garden

Inflow Area = 111,060 sf, 56.82% Impervious, Inflow Depth = 6.22" for 100-Year event
Inflow = 12.93 cfs @ 12.43 hrs, Volume= 57,537 cf
Outflow = 12.47 cfs @ 12.48 hrs, Volume= 57,537 cf, Atten= 4%, Lag= 3.3 min
Primary = 12.47 cfs @ 12.48 hrs, Volume= 57,537 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
Peak Elev= 1,022.03' @ 12.48 hrs Surf.Area= 8,041 sf Storage= 6,228 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 55.7 min (835.7 - 780.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,021.00'	17,908 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,021.00	4,217	0	0
1,022.00	7,835	6,026	6,026
1,023.00	15,928	11,882	17,908

Device	Routing	Invert	Outlet Devices
#1	Primary	1,014.50'	**18.0" Round Culvert** L= 185.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,014.50' / 1,010.80' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	1,018.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,021.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Device 1	1,021.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=12.47 cfs @ 12.48 hrs HW=1,022.03' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 12.47 cfs of 22.15 cfs potential flow)
  - **2=Orifice/Grate** (Passes 0.15 cfs of 0.83 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.15 cfs)
  - **4=Sharp-Crested Rectangular Weir** (Weir Controls 12.32 cfs @ 2.37 fps)

Summary for Pond 7P: Rain Garden 2

Inflow Area = 120,730 sf, 25.75% Impervious, Inflow Depth = 5.57" for 100-Year event
Inflow = 13.81 cfs @ 12.40 hrs, Volume= 56,005 cf
Outflow = 13.67 cfs @ 12.42 hrs, Volume= 56,005 cf, Atten= 1%, Lag= 1.2 min
Primary = 0.15 cfs @ 12.42 hrs, Volume= 6,819 cf
Secondary = 13.52 cfs @ 12.42 hrs, Volume= 49,186 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
Peak Elev= 1,020.29' @ 12.42 hrs Surf.Area= 7,958 sf Storage= 4,014 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 58.9 min (851.8 - 792.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,019.00'	13,917 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

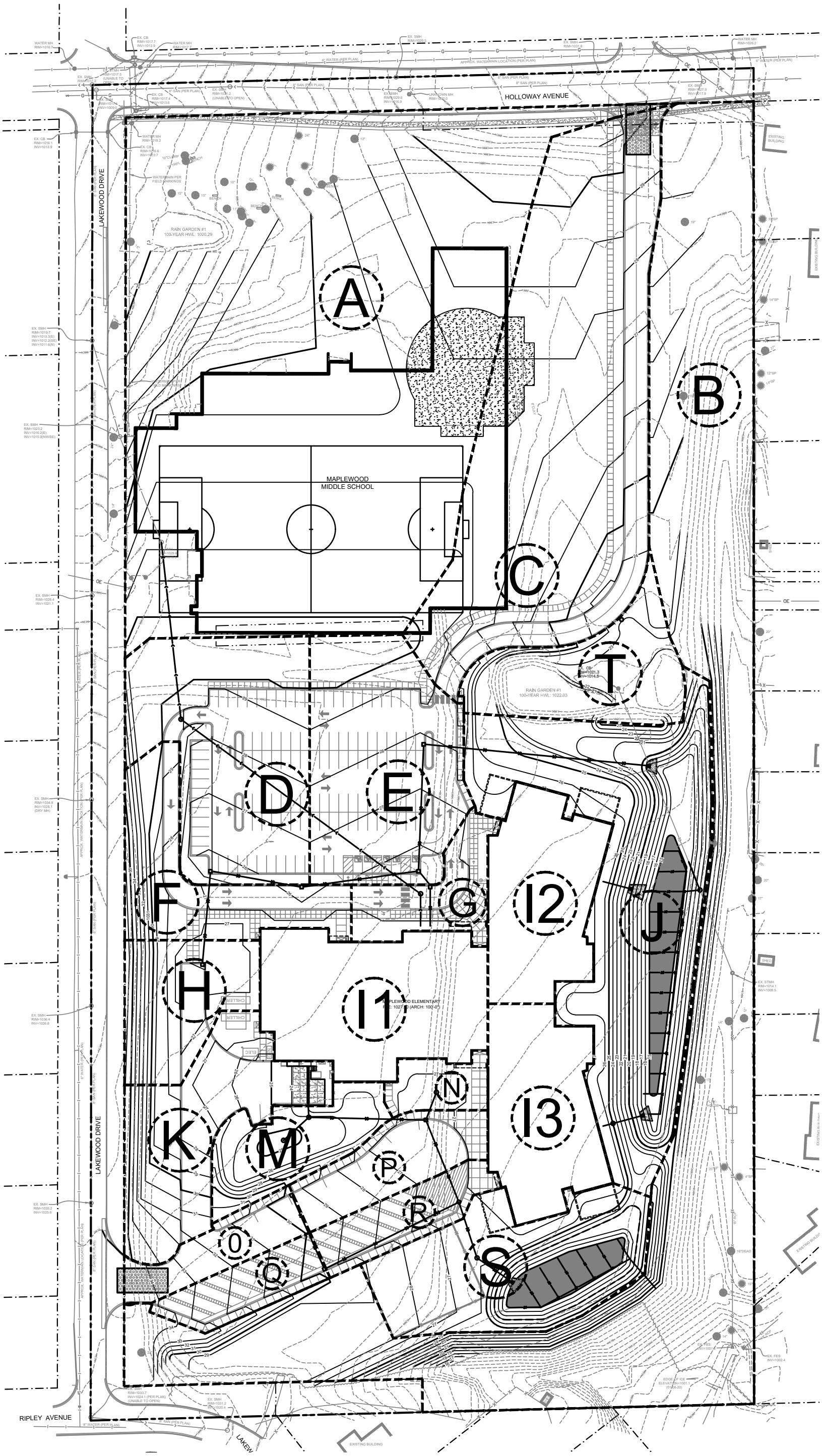
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	1,833	0	0
1,020.00	3,000	2,417	2,417
1,021.00	20,000	11,500	13,917

Device	Routing	Invert	Outlet Devices
#1	Primary	1,013.67'	**15.0" Round Culvert** L= 34.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,013.67' / 1,013.60' S= 0.0020 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,017.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,019.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,020.00'	**35.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

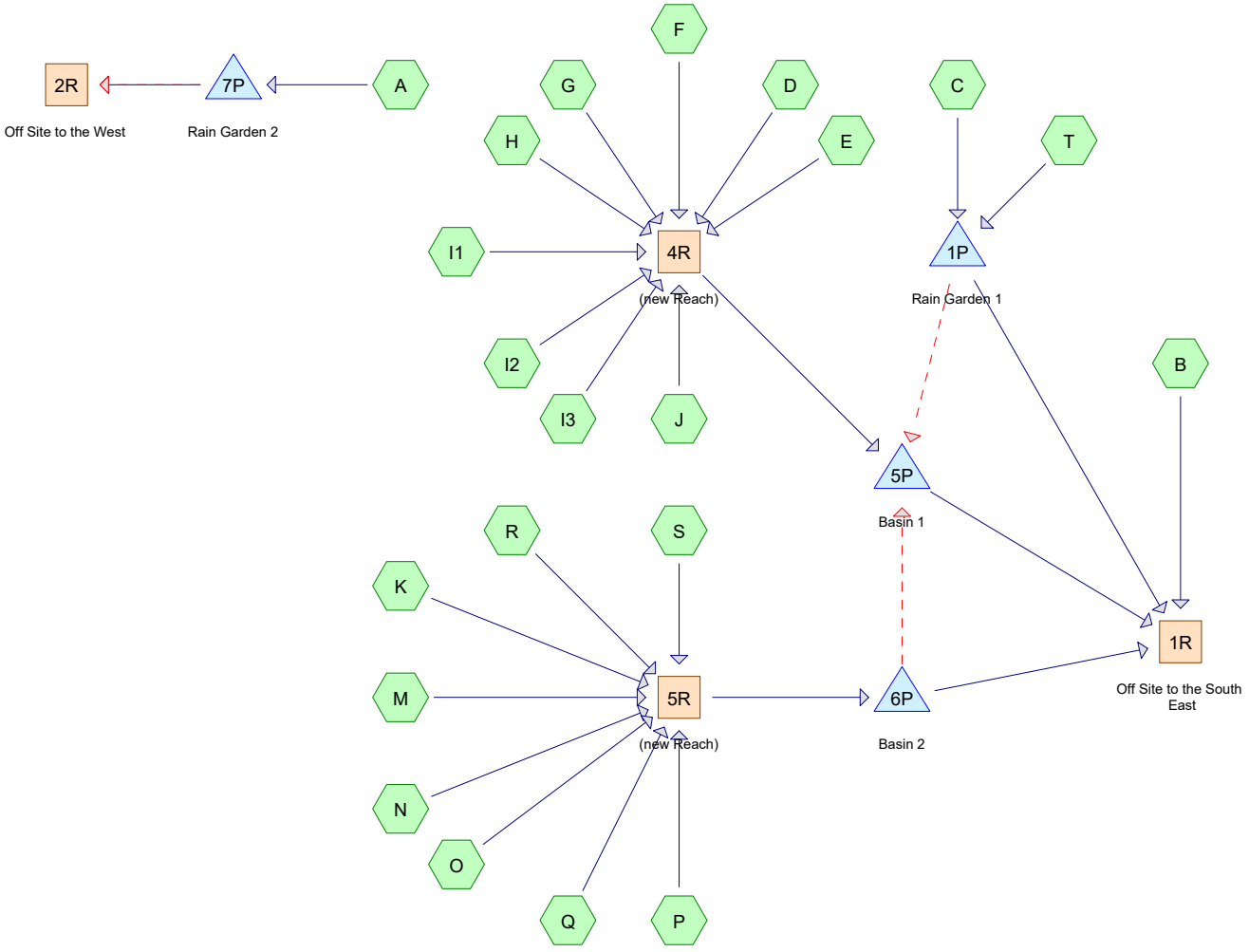
Primary OutFlow Max=0.15 cfs @ 12.42 hrs HW=1,020.29' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.15 cfs of 14.47 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.15 cfs of 0.68 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.15 cfs)

Secondary OutFlow Max=13.52 cfs @ 12.42 hrs HW=1,020.29' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 13.52 cfs @ 1.32 fps)

PROPOSED HYDROCAD AREAS



Maplewood Elementary
Proposed Drainage



Subcat Reach Pond Link

Routing Diagram for Proposed Conditions
Prepared by Larson Engineering, Printed 4/13/2020

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
558,556	80	>75% Grass cover, Good, HSG D (A, B, C, D, E, F, G, H, J, K, M, N, S, T)
232,457	98	New Impervious (A, C, D, E, F, G, H, I1, I2, I3, K, N, O, P, Q, R, S)
791,013	**85**	**TOTAL AREA**

Summary for Subcatchment A:

Runoff = 3.91 cfs @ 12.55 hrs, Volume= 19,093 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	13,142	98	New Impervious
	175,977	80	>75% Grass cover, Good, HSG D
	189,119	81	Weighted Average
	175,977		93.05% Pervious Area
	13,142		6.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.9	300	0.0202	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.9	239	0.0202	2.13		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
38.8	539	Total			

Summary for Subcatchment B:

Runoff = 2.72 cfs @ 12.60 hrs, Volume= 13,686 cf, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

Area (sf)	CN	Description
148,038	80	>75% Grass cover, Good, HSG D
148,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	200	0.0550	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
16.0	100	0.0181	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
7.2	874	0.0181	2.02		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
41.1	1,174	Total			

Summary for Subcatchment C:

Runoff = 2.10 cfs @ 12.60 hrs, Volume= 11,088 cf, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	26,884	98	New Impervious
	57,435	80	>75% Grass cover, Good, HSG D
	84,319	86	Weighted Average
	57,435		68.12% Pervious Area
	26,884		31.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.9	300	0.0156	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.3	147	0.0156	1.87		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
42.2	447	Total			

Summary for Subcatchment D:

Runoff = 2.22 cfs @ 12.19 hrs, Volume= 6,093 cf, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	21,677	98	New Impervious
	15,516	80	>75% Grass cover, Good, HSG D
	37,193	90	Weighted Average
	15,516		41.72% Pervious Area
	21,677		58.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	52	0.0192	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
2.3	200	0.0196	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
11.6	252	Total			

Summary for Subcatchment E:

Runoff = 2.37 cfs @ 12.19 hrs, Volume= 6,599 cf, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	27,965	98	New Impervious
	6,367	80	>75% Grass cover, Good, HSG D
	34,332	95	Weighted Average
	6,367		18.55% Pervious Area
	27,965		81.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	52	0.0192	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
2.3	205	0.0197	1.46		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
11.6	257	Total			

Summary for Subcatchment F:

Runoff = 1.44 cfs @ 12.11 hrs, Volume= 2,847 cf, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	9,052	98	New Impervious
	9,746	80	>75% Grass cover, Good, HSG D
	18,798	89	Weighted Average
	9,746		51.85% Pervious Area
	9,052		48.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.1794	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
0.8	133	0.1310	2.86		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
3.8	172	Total			

Summary for Subcatchment G:

Runoff = 0.91 cfs @ 12.10 hrs, Volume= 1,787 cf, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	7,190	98	New Impervious
	2,615	80	>75% Grass cover, Good, HSG D
	9,805	93	Weighted Average
	2,615		26.67% Pervious Area
	7,190		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	79	0.0152	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment H:

Runoff = 0.56 cfs @ 12.26 hrs, Volume= 1,781 cf, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	3,276	98	New Impervious
	11,653	80	>75% Grass cover, Good, HSG D
	14,929	84	Weighted Average
	11,653		78.06% Pervious Area
	3,276		21.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	30	0.2333	0.23		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
14.9	110	0.0263	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
17.1	140	Total			

Summary for Subcatchment I1:

Runoff = 2.86 cfs @ 12.12 hrs, Volume= 6,204 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	28,867	98	New Impervious
	28,867		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment I2:

Runoff = 2.01 cfs @ 12.12 hrs, Volume= 4,371 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	20,336	98	New Impervious
	20,336		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment I3:

Runoff = 2.01 cfs @ 12.12 hrs, Volume= 4,370 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	20,333	98	New Impervious
	20,333		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment J:

Runoff = 1.55 cfs @ 12.34 hrs, Volume= 5,419 cf, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

Area (sf)	CN	Description
58,622	80	>75% Grass cover, Good, HSG D
58,622		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	235	0.0438	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment K:

Runoff = 1.23 cfs @ 12.23 hrs, Volume= 3,830 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	13,094	98	New Impervious
	10,991	80	>75% Grass cover, Good, HSG D
	24,085	90	Weighted Average
	10,991		45.63% Pervious Area
	13,094		54.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	128	0.0390	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.3	135	0.0407	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
15.7	263	Total			

Summary for Subcatchment M:

Runoff = 0.43 cfs @ 12.23 hrs, Volume= 1,178 cf, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

Area (sf)	CN	Description
12,737	80	>75% Grass cover, Good, HSG D
12,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	103	0.0262	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment N:

Runoff = 0.37 cfs @ 12.16 hrs, Volume= 923 cf, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
	1,229	80	>75% Grass cover, Good, HSG D
*	3,767	98	New Impervious
	4,996	94	Weighted Average
	1,229		24.60% Pervious Area
	3,767		75.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment O:

Runoff = 0.87 cfs @ 12.10 hrs, Volume= 1,771 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	8,239	98	New Impervious
	8,239		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	175	0.0279	1.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment P:

Runoff = 1.24 cfs @ 12.10 hrs, Volume= 2,514 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	11,696	98	New Impervious
	11,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	158	0.0236	1.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment Q:

Runoff = 0.83 cfs @ 12.10 hrs, Volume= 1,678 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	7,806	98	New Impervious
	7,806		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	175	0.0279	1.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment R:

Runoff = 0.93 cfs @ 12.10 hrs, Volume= 1,886 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
*	8,777	98	New Impervious
	8,777		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	148	0.0253	1.52		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment S:

Runoff = 1.81 cfs @ 12.09 hrs, Volume= 2,771 cf, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
	29,149	80	>75% Grass cover, Good, HSG D
*	356	98	New Impervious
	29,505	80	Weighted Average
	29,149		98.79% Pervious Area
	356		1.21% Impervious Area

Summary for Subcatchment T:

Runoff = 0.57 cfs @ 12.26 hrs, Volume= 1,709 cf, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 2-Year Rainfall=2.81"

	Area (sf)	CN	Description
	18,481	80	>75% Grass cover, Good, HSG D
	18,481		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	90	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Reach 1R: Off Site to the South East

Inflow Area = 601,894 sf, 36.44% Impervious, Inflow Depth = 1.64" for 2-Year event
Inflow = 3.21 cfs @ 12.60 hrs, Volume= 82,507 cf
Outflow = 3.21 cfs @ 12.60 hrs, Volume= 82,507 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Off Site to the West

Inflow Area = 189,119 sf, 6.95% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 3.87 cfs @ 12.60 hrs, Volume= 19,094 cf
Outflow = 3.87 cfs @ 12.60 hrs, Volume= 19,094 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: (new Reach)

Inflow Area = 243,215 sf, 57.03% Impervious, Inflow Depth = 1.95" for 2-Year event
Inflow = 13.38 cfs @ 12.12 hrs, Volume= 39,472 cf
Outflow = 13.38 cfs @ 12.12 hrs, Volume= 39,472 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: (new Reach)

Inflow Area = 107,841 sf, 49.83% Impervious, Inflow Depth = 1.84" for 2-Year event
Inflow = 6.77 cfs @ 12.09 hrs, Volume= 16,551 cf
Outflow = 6.77 cfs @ 12.09 hrs, Volume= 16,551 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1P: Rain Garden 1

Inflow Area = 102,800 sf, 26.15% Impervious, Inflow Depth = 1.49" for 2-Year event
Inflow = 2.34 cfs @ 12.52 hrs, Volume= 12,796 cf
Outflow = 0.20 cfs @ 14.66 hrs, Volume= 12,797 cf, Atten= 92%, Lag= 128.2 min
Primary = 0.20 cfs @ 14.66 hrs, Volume= 12,797 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,022.31' @ 14.66 hrs Surf.Area= 10,572 sf Storage= 7,916 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 524.4 min (1,344.7 - 820.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,021.00'	18,479 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,021.00	4,246	0	0
1,022.00	6,356	5,301	5,301
1,023.00	20,000	13,178	18,479

Device	Routing	Invert	Outlet Devices
#1	Primary	1,014.50'	**18.0" Round Culvert** L= 185.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,014.50' / 1,010.80' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	1,016.47'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,021.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,022.50'	**20.0' long x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.20 cfs @ 14.66 hrs HW=1,022.31' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.20 cfs of 22.61 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.20 cfs of 1.00 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.20 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,021.00' TW=1,015.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 5P: Basin 1

Inflow Area = 243,215 sf, 57.03% Impervious, Inflow Depth = 1.95" for 2-Year event
Inflow = 13.38 cfs @ 12.12 hrs, Volume= 39,472 cf
Outflow = 0.29 cfs @ 15.38 hrs, Volume= 39,473 cf, Atten= 98%, Lag= 195.6 min
Primary = 0.29 cfs @ 15.38 hrs, Volume= 39,473 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,017.65' @ 15.38 hrs Surf.Area= 15,433 sf Storage= 28,560 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1,073.8 min (1,847.3 - 773.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,015.00'	99,541 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,015.00	5,324	0	0
1,016.00	9,989	7,657	7,657
1,017.00	13,212	11,601	19,257
1,018.00	16,632	14,922	34,179
1,019.00	20,311	18,472	52,651
1,020.00	24,235	22,273	74,924
1,021.00	25,000	24,618	99,541

Device	Routing	Invert	Outlet Devices
#1	Primary	1,012.00'	**15.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,012.00' / 1,010.99' S= 0.0191 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,013.67'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,015.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Device 1	1,017.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Device 1	1,019.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,020.30'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.29 cfs @ 15.38 hrs HW=1,017.65' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.29 cfs of 13.25 cfs potential flow)
  - **2=Orifice/Grate** (Passes 0.29 cfs of 0.82 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.29 cfs)
  - **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 6P: Basin 2

Inflow Area = 107,841 sf, 49.83% Impervious, Inflow Depth = 1.84" for 2-Year event
Inflow = 6.77 cfs @ 12.09 hrs, Volume= 16,551 cf
Outflow = 0.13 cfs @ 15.24 hrs, Volume= 16,551 cf, Atten= 98%, Lag= 189.2 min
Primary = 0.13 cfs @ 15.24 hrs, Volume= 16,551 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,022.12' @ 15.24 hrs Surf.Area= 6,919 sf Storage= 11,521 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 925.8 min (1,699.5 - 773.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	39,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	4,100	0	0
1,021.00	5,334	4,717	4,717
1,022.00	6,669	6,002	10,719
1,023.00	8,782	7,726	18,444
1,024.00	10,768	9,775	28,219
1,025.00	12,000	11,384	39,603

Device	Routing	Invert	Outlet Devices
#1	Primary	1,018.50'	**6.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,018.50' / 1,018.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	1,018.67'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,020.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,023.20'	**80.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.13 cfs @ 15.24 hrs HW=1,022.12' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.13 cfs of 1.28 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.13 cfs of 0.76 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.13 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,020.00' TW=1,015.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 7P: Rain Garden 2

Inflow Area = 189,119 sf, 6.95% Impervious, Inflow Depth = 1.21" for 2-Year event
Inflow = 3.91 cfs @ 12.55 hrs, Volume= 19,093 cf
Outflow = 3.87 cfs @ 12.60 hrs, Volume= 19,094 cf, Atten= 1%, Lag= 2.7 min
Primary = 0.10 cfs @ 12.60 hrs, Volume= 5,474 cf
Secondary = 3.77 cfs @ 12.60 hrs, Volume= 13,620 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,020.13' @ 12.60 hrs Surf.Area= 5,160 sf Storage= 2,935 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 145.3 min (985.4 - 840.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,019.00'	13,917 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	1,833	0	0
1,020.00	3,000	2,417	2,417
1,021.00	20,000	11,500	13,917

Device	Routing	Invert	Outlet Devices
#1	Primary	1,013.67'	**15.0" Round Culvert** L= 34.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,013.67' / 1,013.60' S= 0.0020 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,017.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,019.00'	**0.800 in/hr Exfiltration over Surface area**

#4	Secondary	1,020.00'	**35.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.10 cfs @ 12.60 hrs HW=1,020.13' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.10 cfs of 14.27 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.10 cfs of 0.66 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Secondary OutFlow Max=3.77 cfs @ 12.60 hrs HW=1,020.13' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 3.77 cfs @ 0.85 fps)

Summary for Subcatchment A:

Runoff = 7.66 cfs @ 12.55 hrs, Volume= 36,589 cf, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	13,142	98	New Impervious
	175,977	80	>75% Grass cover, Good, HSG D
	189,119	81	Weighted Average
	175,977		93.05% Pervious Area
	13,142		6.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.9	300	0.0202	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.9	239	0.0202	2.13		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
38.8	539	Total			

Summary for Subcatchment B:

Runoff = 5.53 cfs @ 12.56 hrs, Volume= 27,137 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

Area (sf)	CN	Description
148,038	80	>75% Grass cover, Good, HSG D
148,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	200	0.0550	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
16.0	100	0.0181	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
7.2	874	0.0181	2.02		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
41.1	1,174	Total			

Summary for Subcatchment C:

Runoff = 3.73 cfs @ 12.57 hrs, Volume= 19,388 cf, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	26,884	98	New Impervious
	57,435	80	>75% Grass cover, Good, HSG D
	84,319	86	Weighted Average
	57,435		68.12% Pervious Area
	26,884		31.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.9	300	0.0156	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.3	147	0.0156	1.87		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
42.2	447	Total			

Summary for Subcatchment D:

Runoff = 3.63 cfs @ 12.19 hrs, Volume= 9,988 cf, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	21,677	98	New Impervious
	15,516	80	>75% Grass cover, Good, HSG D
	37,193	90	Weighted Average
	15,516		41.72% Pervious Area
	21,677		58.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	52	0.0192	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
2.3	200	0.0196	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
11.6	252	Total			

Summary for Subcatchment E:

Runoff = 3.68 cfs @ 12.19 hrs, Volume= 10,383 cf, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	27,965	98	New Impervious
	6,367	80	>75% Grass cover, Good, HSG D
	34,332	95	Weighted Average
	6,367		18.55% Pervious Area
	27,965		81.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	52	0.0192	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
2.3	205	0.0197	1.46		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
11.6	257	Total			

Summary for Subcatchment F:

Runoff = 2.40 cfs @ 12.11 hrs, Volume= 4,770 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	9,052	98	New Impervious
	9,746	80	>75% Grass cover, Good, HSG D
	18,798	89	Weighted Average
	9,746		51.85% Pervious Area
	9,052		48.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.1794	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
0.8	133	0.1310	2.86		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
3.8	172	Total			

Summary for Subcatchment G:

Runoff = 1.43 cfs @ 12.10 hrs, Volume= 2,849 cf, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	7,190	98	New Impervious
	2,615	80	>75% Grass cover, Good, HSG D
	9,805	93	Weighted Average
	2,615		26.67% Pervious Area
	7,190		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	79	0.0152	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment H:

Runoff = 1.03 cfs @ 12.26 hrs, Volume= 3,216 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	3,276	98	New Impervious
	11,653	80	>75% Grass cover, Good, HSG D
	14,929	84	Weighted Average
	11,653		78.06% Pervious Area
	3,276		21.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	30	0.2333	0.23		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
14.9	110	0.0263	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
17.1	140	Total			

Summary for Subcatchment I1:

Runoff = 4.29 cfs @ 12.12 hrs, Volume= 9,513 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	28,867	98	New Impervious
	28,867		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment I2:

Runoff = 3.02 cfs @ 12.12 hrs, Volume= 6,702 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	20,336	98	New Impervious
	20,336		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment I3:

Runoff = 3.02 cfs @ 12.12 hrs, Volume= 6,701 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	20,333	98	New Impervious
	20,333		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment J:

Runoff = 3.13 cfs @ 12.32 hrs, Volume= 10,746 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

Area (sf)	CN	Description
58,622	80	>75% Grass cover, Good, HSG D
58,622		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	235	0.0438	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment K:

Runoff = 2.03 cfs @ 12.23 hrs, Volume= 6,330 cf, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	13,094	98	New Impervious
	10,991	80	>75% Grass cover, Good, HSG D
	24,085	90	Weighted Average
	10,991		45.63% Pervious Area
	13,094		54.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	128	0.0390	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.3	135	0.0407	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
15.7	263	Total			

Summary for Subcatchment M:

Runoff = 0.86 cfs @ 12.23 hrs, Volume= 2,335 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

Area (sf)	CN	Description
12,737	80	>75% Grass cover, Good, HSG D
12,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	103	0.0262	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment N:

Runoff = 0.58 cfs @ 12.16 hrs, Volume= 1,467 cf, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
	1,229	80	>75% Grass cover, Good, HSG D
*	3,767	98	New Impervious
	4,996	94	Weighted Average
	1,229		24.60% Pervious Area
	3,767		75.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment O:

Runoff = 1.31 cfs @ 12.10 hrs, Volume= 2,715 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	8,239	98	New Impervious
	8,239		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	175	0.0279	1.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment P:

Runoff = 1.86 cfs @ 12.10 hrs, Volume= 3,854 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	11,696	98	New Impervious
	11,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	158	0.0236	1.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment Q:

Runoff = 1.24 cfs @ 12.10 hrs, Volume= 2,573 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	7,806	98	New Impervious
	7,806		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	175	0.0279	1.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment R:

Runoff = 1.39 cfs @ 12.10 hrs, Volume= 2,893 cf, Depth= 3.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
*	8,777	98	New Impervious
	8,777		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	148	0.0253	1.52		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment S:

Runoff = 3.31 cfs @ 12.09 hrs, Volume= 5,461 cf, Depth= 2.22"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
	29,149	80	>75% Grass cover, Good, HSG D
*	356	98	New Impervious
	29,505	80	Weighted Average
	29,149		98.79% Pervious Area
	356		1.21% Impervious Area

Summary for Subcatchment T:

Runoff = 1.15 cfs @ 12.26 hrs, Volume= 3,388 cf, Depth= 2.20"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 10-Year Rainfall=4.19"

	Area (sf)	CN	Description
	18,481	80	>75% Grass cover, Good, HSG D
	18,481		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	90	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Reach 1R: Off Site to the South East

Inflow Area = 601,894 sf, 36.44% Impervious, Inflow Depth = 2.84" for 10-Year event
Inflow = 8.84 cfs @ 12.65 hrs, Volume= 142,409 cf
Outflow = 8.84 cfs @ 12.65 hrs, Volume= 142,409 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Off Site to the West

Inflow Area = 189,119 sf, 6.95% Impervious, Inflow Depth = 2.32" for 10-Year event
Inflow = 7.60 cfs @ 12.57 hrs, Volume= 36,589 cf
Outflow = 7.60 cfs @ 12.57 hrs, Volume= 36,589 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: (new Reach)

Inflow Area = 243,215 sf, 57.03% Impervious, Inflow Depth = 3.20" for 10-Year event
Inflow = 21.36 cfs @ 12.12 hrs, Volume= 64,867 cf
Outflow = 21.36 cfs @ 12.12 hrs, Volume= 64,867 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: (new Reach)

Inflow Area = 107,841 sf, 49.83% Impervious, Inflow Depth = 3.07" for 10-Year event
Inflow = 11.17 cfs @ 12.09 hrs, Volume= 27,627 cf
Outflow = 11.17 cfs @ 12.09 hrs, Volume= 27,627 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1P: Rain Garden 1

Inflow Area = 102,800 sf, 26.15% Impervious, Inflow Depth = 2.66" for 10-Year event
Inflow = 4.20 cfs @ 12.52 hrs, Volume= 22,776 cf
Outflow = 1.74 cfs @ 13.13 hrs, Volume= 22,777 cf, Atten= 59%, Lag= 36.5 min
Primary = 0.27 cfs @ 13.13 hrs, Volume= 17,742 cf
Secondary = 1.47 cfs @ 13.13 hrs, Volume= 5,035 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,022.59' @ 13.13 hrs Surf.Area= 14,418 sf Storage= 11,439 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 436.4 min (1,249.2 - 812.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,021.00'	18,479 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,021.00	4,246	0	0
1,022.00	6,356	5,301	5,301
1,023.00	20,000	13,178	18,479

Device	Routing	Invert	Outlet Devices
#1	Primary	1,014.50'	**18.0" Round Culvert** L= 185.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,014.50' / 1,010.80' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	1,016.47'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,021.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,022.50'	**20.0' long x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.27 cfs @ 13.13 hrs HW=1,022.59' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.27 cfs of 22.97 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.27 cfs of 1.03 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.27 cfs)

Secondary OutFlow Max=1.47 cfs @ 13.13 hrs HW=1,022.59' TW=1,018.28' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 1.47 cfs @ 0.81 fps)

Summary for Pond 5P: Basin 1

Inflow Area = 243,215 sf, 57.03% Impervious, Inflow Depth = 3.46" for 10-Year event
Inflow = 21.36 cfs @ 12.12 hrs, Volume= 70,045 cf
Outflow = 3.33 cfs @ 13.21 hrs, Volume= 70,046 cf, Atten= 84%, Lag= 65.4 min
Primary = 3.33 cfs @ 13.21 hrs, Volume= 70,046 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,018.28' @ 13.21 hrs Surf.Area= 17,661 sf Storage= 38,974 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 814.7 min (1,586.9 - 772.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,015.00'	99,541 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,015.00	5,324	0	0
1,016.00	9,989	7,657	7,657
1,017.00	13,212	11,601	19,257
1,018.00	16,632	14,922	34,179
1,019.00	20,311	18,472	52,651
1,020.00	24,235	22,273	74,924
1,021.00	25,000	24,618	99,541

Device	Routing	Invert	Outlet Devices
#1	Primary	1,012.00'	**15.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,012.00' / 1,010.99' S= 0.0191 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,013.67'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,015.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Device 1	1,017.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Device 1	1,019.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,020.30'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=3.33 cfs @ 13.21 hrs HW=1,018.28' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.33 cfs of 14.05 cfs potential flow)
  - **2=Orifice/Grate** (Passes 0.33 cfs of 0.89 cfs potential flow)
    - **3=Exfiltration** (Exfiltration Controls 0.33 cfs)
  - **4=Sharp-Crested Rectangular Weir** (Weir Controls 3.00 cfs @ 2.01 fps)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 6P: Basin 2

Inflow Area = 107,841 sf, 49.83% Impervious, Inflow Depth = 3.07" for 10-Year event
Inflow = 11.17 cfs @ 12.09 hrs, Volume= 27,627 cf
Outflow = 0.24 cfs @ 15.05 hrs, Volume= 27,627 cf, Atten= 98%, Lag= 177.9 min
Primary = 0.17 cfs @ 15.05 hrs, Volume= 27,485 cf
Secondary = 0.07 cfs @ 15.05 hrs, Volume= 142 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,023.21' @ 15.05 hrs Surf.Area= 9,189 sf Storage= 20,286 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1,294.2 min (2,062.5 - 768.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	39,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	4,100	0	0
1,021.00	5,334	4,717	4,717
1,022.00	6,669	6,002	10,719
1,023.00	8,782	7,726	18,444
1,024.00	10,768	9,775	28,219
1,025.00	12,000	11,384	39,603

Device	Routing	Invert	Outlet Devices
#1	Primary	1,018.50'	**6.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,018.50' / 1,018.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	1,018.67'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,020.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,023.20'	**80.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.17 cfs @ 15.05 hrs HW=1,023.21' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Passes 0.17 cfs of 1.46 cfs potential flow)
↑**2=Orifice/Grate** (Passes 0.17 cfs of 0.88 cfs potential flow)
↑**3=Exfiltration** (Exfiltration Controls 0.17 cfs)

Secondary OutFlow Max=0.07 cfs @ 15.05 hrs HW=1,023.21' TW=1,018.05' (Dynamic Tailwater)
↑**4=Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.17 fps)

Summary for Pond 7P: Rain Garden 2

Inflow Area =	189,119 sf,	6.95% Impervious,	Inflow Depth =	2.32" for 10-Year event
Inflow =	7.66 cfs @	12.55 hrs, Volume=	36,589 cf	
Outflow =	7.60 cfs @	12.57 hrs, Volume=	36,589 cf,	Atten= 1%, Lag= 1.7 min
Primary =	0.12 cfs @	12.57 hrs, Volume=	5,965 cf	
Secondary =	7.48 cfs @	12.57 hrs, Volume=	30,624 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,020.20' @ 12.57 hrs Surf.Area= 6,409 sf Storage= 3,360 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 80.6 min (909.3 - 828.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,019.00'	13,917 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	1,833	0	0
1,020.00	3,000	2,417	2,417
1,021.00	20,000	11,500	13,917

Device	Routing	Invert	Outlet Devices
#1	Primary	1,013.67'	**15.0" Round Culvert** L= 34.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,013.67' / 1,013.60' S= 0.0020 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,017.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,019.00'	**0.800 in/hr Exfiltration over Surface area**

#4	Secondary	1,020.00'	**35.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.12 cfs @ 12.57 hrs HW=1,020.20' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.12 cfs of 14.36 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.12 cfs of 0.67 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.12 cfs)

Secondary OutFlow Max=7.48 cfs @ 12.57 hrs HW=1,020.20' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 7.48 cfs @ 1.07 fps)

Summary for Subcatchment A:

Runoff = 17.01 cfs @ 12.54 hrs, Volume= 81,529 cf, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	13,142	98	New Impervious
	175,977	80	>75% Grass cover, Good, HSG D
	189,119	81	Weighted Average
	175,977		93.05% Pervious Area
	13,142		6.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.9	300	0.0202	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.9	239	0.0202	2.13		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
38.8	539	Total			

Summary for Subcatchment B:

Runoff = 12.62 cfs @ 12.56 hrs, Volume= 62,025 cf, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

Area (sf)	CN	Description
148,038	80	>75% Grass cover, Good, HSG D
148,038		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	200	0.0550	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
16.0	100	0.0181	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
7.2	874	0.0181	2.02		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
41.1	1,174	Total			

Summary for Subcatchment C:

Runoff = 7.68 cfs @ 12.57 hrs, Volume= 40,017 cf, Depth= 5.70"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	26,884	98	New Impervious
	57,435	80	>75% Grass cover, Good, HSG D
	84,319	86	Weighted Average
	57,435		68.12% Pervious Area
	26,884		31.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
40.9	300	0.0156	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.3	147	0.0156	1.87		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
42.2	447	Total			

Summary for Subcatchment D:

Runoff = 6.96 cfs @ 12.19 hrs, Volume= 19,364 cf, Depth= 6.25"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	21,677	98	New Impervious
	15,516	80	>75% Grass cover, Good, HSG D
	37,193	90	Weighted Average
	15,516		41.72% Pervious Area
	21,677		58.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	52	0.0192	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
2.3	200	0.0196	1.45		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
11.6	252	Total			

Summary for Subcatchment E:

Runoff = 6.73 cfs @ 12.19 hrs, Volume= 19,262 cf, Depth= 6.73"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	27,965	98	New Impervious
	6,367	80	>75% Grass cover, Good, HSG D
	34,332	95	Weighted Average
	6,367		18.55% Pervious Area
	27,965		81.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	52	0.0192	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
2.3	205	0.0197	1.46		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
11.6	257	Total			

Summary for Subcatchment F:

Runoff = 4.66 cfs @ 12.11 hrs, Volume= 9,455 cf, Depth= 6.04"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	9,052	98	New Impervious
	9,746	80	>75% Grass cover, Good, HSG D
	18,798	89	Weighted Average
	9,746		51.85% Pervious Area
	9,052		48.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.1794	0.22		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
0.8	133	0.1310	2.86		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
3.8	172	Total			

Summary for Subcatchment G:

Runoff = 2.63 cfs @ 12.10 hrs, Volume= 5,362 cf, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	7,190	98	New Impervious
	2,615	80	>75% Grass cover, Good, HSG D
	9,805	93	Weighted Average
	2,615		26.67% Pervious Area
	7,190		73.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	79	0.0152	1.09		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment H:

Runoff = 2.17 cfs @ 12.25 hrs, Volume= 6,826 cf, Depth= 5.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	3,276	98	New Impervious
	11,653	80	>75% Grass cover, Good, HSG D
	14,929	84	Weighted Average
	11,653		78.06% Pervious Area
	3,276		21.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	30	0.2333	0.23		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
14.9	110	0.0263	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
17.1	140	Total			

Summary for Subcatchment I1:

Runoff = 7.57 cfs @ 12.12 hrs, Volume= 17,129 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	28,867	98	New Impervious
	28,867		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment I2:

Runoff = 5.34 cfs @ 12.12 hrs, Volume= 12,067 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	20,336	98	New Impervious
	20,336		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment I3:

Runoff = 5.34 cfs @ 12.12 hrs, Volume= 12,065 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	20,333	98	New Impervious
	20,333		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Subcatchment J:

Runoff = 7.10 cfs @ 12.32 hrs, Volume= 24,561 cf, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

Area (sf)	CN	Description
58,622	80	>75% Grass cover, Good, HSG D
58,622		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.3	235	0.0438	0.18		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment K:

Runoff = 3.94 cfs @ 12.23 hrs, Volume= 12,375 cf, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	13,094	98	New Impervious
	10,991	80	>75% Grass cover, Good, HSG D
	24,085	90	Weighted Average
	10,991		45.63% Pervious Area
	13,094		54.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.4	128	0.0390	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"
1.3	135	0.0407	1.80		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"
15.7	263	Total			

Summary for Subcatchment M:

Runoff = 1.93 cfs @ 12.22 hrs, Volume= 5,337 cf, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

Area (sf)	CN	Description
12,737	80	>75% Grass cover, Good, HSG D
12,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	103	0.0262	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment N:

Runoff = 1.08 cfs @ 12.16 hrs, Volume= 2,750 cf, Depth= 6.61"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
	1,229	80	>75% Grass cover, Good, HSG D
*	3,767	98	New Impervious
	4,996	94	Weighted Average
	1,229		24.60% Pervious Area
	3,767		75.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	50	0.0200	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Subcatchment O:

Runoff = 2.31 cfs @ 12.10 hrs, Volume= 4,889 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	8,239	98	New Impervious
	8,239		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	175	0.0279	1.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment P:

Runoff = 3.27 cfs @ 12.10 hrs, Volume= 6,940 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	11,696	98	New Impervious
	11,696		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	158	0.0236	1.49		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment Q:

Runoff = 2.18 cfs @ 12.10 hrs, Volume= 4,632 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	7,806	98	New Impervious
	7,806		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	175	0.0279	1.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment R:

Runoff = 2.46 cfs @ 12.09 hrs, Volume= 5,208 cf, Depth= 7.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
*	8,777	98	New Impervious
	8,777		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	148	0.0253	1.52		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.75"

Summary for Subcatchment S:

Runoff = 7.07 cfs @ 12.09 hrs, Volume= 12,424 cf, Depth= 5.05"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
	29,149	80	>75% Grass cover, Good, HSG D
*	356	98	New Impervious
	29,505	80	Weighted Average
	29,149		98.79% Pervious Area
	356		1.21% Impervious Area

Summary for Subcatchment T:

Runoff = 2.58 cfs @ 12.25 hrs, Volume= 7,743 cf, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-90.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=7.36"

	Area (sf)	CN	Description
	18,481	80	>75% Grass cover, Good, HSG D
	18,481		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	90	0.0130	0.09		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.75"

Summary for Reach 1R: Off Site to the South East

Inflow Area = 601,894 sf, 36.44% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 29.06 cfs @ 12.56 hrs, Volume= 290,432 cf
Outflow = 29.06 cfs @ 12.56 hrs, Volume= 290,432 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 2R: Off Site to the West

Inflow Area = 189,119 sf, 6.95% Impervious, Inflow Depth = 5.17" for 100-Year event
Inflow = 16.90 cfs @ 12.56 hrs, Volume= 81,529 cf
Outflow = 16.90 cfs @ 12.56 hrs, Volume= 81,529 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 4R: (new Reach)

Inflow Area = 243,215 sf, 57.03% Impervious, Inflow Depth = 6.22" for 100-Year event
Inflow = 40.21 cfs @ 12.12 hrs, Volume= 126,091 cf
Outflow = 40.21 cfs @ 12.12 hrs, Volume= 126,091 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Reach 5R: (new Reach)

Inflow Area = 107,841 sf, 49.83% Impervious, Inflow Depth = 6.07" for 100-Year event
Inflow = 21.56 cfs @ 12.09 hrs, Volume= 54,555 cf
Outflow = 21.56 cfs @ 12.09 hrs, Volume= 54,555 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2

Summary for Pond 1P: Rain Garden 1

Inflow Area = 102,800 sf, 26.15% Impervious, Inflow Depth = 5.58" for 100-Year event
Inflow = 8.72 cfs @ 12.52 hrs, Volume= 47,760 cf
Outflow = 7.82 cfs @ 12.68 hrs, Volume= 47,760 cf, Atten= 10%, Lag= 9.8 min
Primary = 0.31 cfs @ 12.68 hrs, Volume= 21,318 cf
Secondary = 7.50 cfs @ 12.68 hrs, Volume= 26,443 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,022.77' @ 12.68 hrs Surf.Area= 16,851 sf Storage= 14,226 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 255.3 min (1,057.5 - 802.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1,021.00'	18,479 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,021.00	4,246	0	0
1,022.00	6,356	5,301	5,301
1,023.00	20,000	13,178	18,479

Device	Routing	Invert	Outlet Devices
#1	Primary	1,014.50'	**18.0" Round Culvert** L= 185.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,014.50' / 1,010.80' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf
#2	Device 1	1,016.47'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,021.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,022.50'	**20.0' long x 30.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.31 cfs @ 12.68 hrs HW=1,022.77' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.31 cfs of 23.17 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.31 cfs of 1.04 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.31 cfs)

Secondary OutFlow Max=7.50 cfs @ 12.68 hrs HW=1,022.77' TW=1,019.98' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 7.50 cfs @ 1.39 fps)

Summary for Pond 5P: Basin 1

Inflow Area = 243,215 sf, 57.03% Impervious, Inflow Depth = 8.76" for 100-Year event
Inflow = 53.92 cfs @ 12.13 hrs, Volume= 177,558 cf
Outflow = 16.03 cfs @ 12.74 hrs, Volume= 177,559 cf, Atten= 70%, Lag= 36.8 min
Primary = 16.03 cfs @ 12.74 hrs, Volume= 177,559 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,019.98' @ 12.74 hrs Surf.Area= 24,158 sf Storage= 74,451 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 369.6 min (1,139.1 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,015.00'	99,541 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,015.00	5,324	0	0
1,016.00	9,989	7,657	7,657
1,017.00	13,212	11,601	19,257
1,018.00	16,632	14,922	34,179
1,019.00	20,311	18,472	52,651
1,020.00	24,235	22,273	74,924
1,021.00	25,000	24,618	99,541

Device	Routing	Invert	Outlet Devices
#1	Primary	1,012.00'	**15.0" Round Culvert** L= 53.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,012.00' / 1,010.99' S= 0.0191 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,013.67'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,015.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Device 1	1,017.90'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Device 1	1,019.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,020.30'	**4.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=16.03 cfs @ 12.74 hrs HW=1,019.98' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 16.03 cfs @ 13.06 fps)
- **2=Orifice/Grate** (Passes < 1.04 cfs potential flow)
  - **3=Exfiltration** (Passes < 0.45 cfs potential flow)
- **4=Sharp-Crested Rectangular Weir** (Passes < 35.17 cfs potential flow)
- **5=Orifice/Grate** (Passes < 14.98 cfs potential flow)
- **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 6P: Basin 2

Inflow Area = 107,841 sf, 49.83% Impervious, Inflow Depth = 6.07" for 100-Year event
Inflow = 21.56 cfs @ 12.09 hrs, Volume= 54,555 cf
Outflow = 13.86 cfs @ 12.13 hrs, Volume= 54,555 cf, Atten= 36%, Lag= 2.3 min
Primary = 0.18 cfs @ 12.13 hrs, Volume= 29,531 cf
Secondary = 13.68 cfs @ 12.13 hrs, Volume= 25,024 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,023.37' @ 12.13 hrs Surf.Area= 9,518 sf Storage= 21,834 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 719.5 min (1,480.0 - 760.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,020.00'	39,603 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,020.00	4,100	0	0
1,021.00	5,334	4,717	4,717
1,022.00	6,669	6,002	10,719
1,023.00	8,782	7,726	18,444
1,024.00	10,768	9,775	28,219
1,025.00	12,000	11,384	39,603

Device	Routing	Invert	Outlet Devices
#1	Primary	1,018.50'	**6.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,018.50' / 1,018.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#2	Device 1	1,018.67'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,020.00'	**0.800 in/hr Exfiltration over Surface area**
#4	Secondary	1,023.20'	**80.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.18 cfs @ 12.13 hrs HW=1,023.37' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.18 cfs of 1.49 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.18 cfs of 0.89 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.18 cfs)

Secondary OutFlow Max=13.60 cfs @ 12.13 hrs HW=1,023.37' TW=1,018.66' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 13.60 cfs @ 1.00 fps)

Summary for Pond 7P: Rain Garden 2

Inflow Area =	189,119 sf,	6.95% Impervious,	Inflow Depth =	5.17" for 100-Year event
Inflow =	17.01 cfs @	12.54 hrs, Volume=	81,529 cf	
Outflow =	16.90 cfs @	12.56 hrs, Volume=	81,529 cf,	Atten= 1%, Lag= 1.2 min
Primary =	0.16 cfs @	12.56 hrs, Volume=	6,815 cf	
Secondary =	16.74 cfs @	12.56 hrs, Volume=	74,714 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-90.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 1,020.33' @ 12.56 hrs Surf.Area= 8,665 sf Storage= 4,360 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 40.3 min (854.7 - 814.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,019.00'	13,917 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,019.00	1,833	0	0
1,020.00	3,000	2,417	2,417
1,021.00	20,000	11,500	13,917

Device	Routing	Invert	Outlet Devices
#1	Primary	1,013.67'	**15.0" Round Culvert** L= 34.7' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,013.67' / 1,013.60' S= 0.0020 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	1,017.50'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 2	1,019.00'	**0.800 in/hr Exfiltration over Surface area**

#4	Secondary	1,020.00'	**35.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.16 cfs @ 12.56 hrs HW=1,020.33' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 0.16 cfs of 14.52 cfs potential flow)
↑—**2=Orifice/Grate** (Passes 0.16 cfs of 0.69 cfs potential flow)
↑—**3=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=16.74 cfs @ 12.56 hrs HW=1,020.33' TW=0.00' (Dynamic Tailwater)
↑—**4=Broad-Crested Rectangular Weir** (Weir Controls 16.74 cfs @ 1.44 fps)